A FEW THOUGHTS ON CHOLERA,

IN REFERENCE TO ITS

ORIGIN, THE NATURE OF THE EXCITING CAUSE,
AND
THE PRINCIPLE OF TREATMENT.

BY

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> "*Homo, naturæ minister et interpres, tantum facit et intelligit quantum de naturæ ordine re vel mente observaverit; nec amplius scit, ant potest.*"—BACON.

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MUCH has been written on the subject of Cholera; but it strikes me, that, as to the origin and nature of Epidemics, the opinions of SYDENHAM have not had the consideration and influence which their weight and importance merit. Like some other opinions of this sagacious observer, not necessary now to advert to, they have been overlooked, or doubted, or considered fanciful; of late years, however, they have been advanced in more physiological language and scientific form, and hence considered as important acquisitions to medical knowledge; indeed I will venture to predict, that, when all the conflicting theories as to the origin of Cholera shall have had their day, the conclusion of Sydenham as to the source of Epidemics in general, will be pronounced as most in accordance with reason and experience.

It is well known that the opinion of our English Hippocrates was, that "Epidemics arose from some secret and inexplicable alteration in the bowels of the earth;" for, after long observation, he says, that he could not account for them from any cognizant changes in the constitution of the atmosphere, though certain changes might predispose an individual to be affected by the epidemic agent. Sydenham's opinion appears to apply with peculiar force in accounting for the course and spread of malignant Cholera, coupled with his belief that all epidemic diseases of a malignant nature are capable of propagating themselves from one individual to another. I am aware that some authors have maintained the telluric origin of malignant Cholera; and that that truly original thinker and enlightened physician, Dr. R. Williams, after taking a comprehensive view of all the assigned causes of this epidemic, says, that such is probably the true one; but by most writers this opinion is considered as of little value. The writer of a late elaborate review on the causes and diffusion of Cholera, in adverting to the nature of its specific cause, does not even distinctly allude to the above opinion; and Dr. Copland, whose industry seems to have ransacked the medical literature of all nations and tongues in his highly valuable Dictionary, under the all-absorbing idea that every case arises from contagion, merely mentions the supposition of the telluric origin of Cholera as one of the groundless theories in accounting for this disease.

Now the object of this paper is to shew—

First.—That we have, from facts, very strong evidence to lead us to assign the specific cause of malignant Cholera to some secret emanation from the lower parts of the earth, and that it is probably some agent analogous to electricity.

Secondly.—I shall endeavour to prove that malignant Cholera is infectious, according to the important principle laid down by Sydenham, "that all epidemic diseases of a malignant nature are capable of propagating themselves by contagion;" for if this is not the case, it is an exception to the laws which rule all other epidemics of a malignant nature.

Thirdly.—I shall also attempt to shew, that simple diluents, as water, whatever other means may be serviceable, are equally demanded, as well by the pathological state of the system, as by the strong instincts of nature.

I shall convey my observations on these points in as few words as possible; for if the facts upon which I ground my reasoning are not applicable, all lengthened discussions on them would be worse than useless; but if they have a direct bearing on what it is my object to prove, the practical consequences may be of vital importance.

As regards the first point in question,—the origin of the specific cause of Cholera, deep mystery has been attached to it; but in reasoning upon it, we shall do well to keep in mind the sensible and philosophical observations of that highly judicious physician, Professor Alison, of Edinburgh, who says, "When we complain of many of the phenomena of disease being inexplicable, we are too apt to forget that nothing in nature is explicable, except so far as it admits of comparison with things more simple and more familiar." What this eminent author affirms respecting the mysterious nature of the phenomena of disease, may be applied to the specific causes of epidemics. The Psalmist, likewise, thousands of years ago, spoke of the "Pestilence which walketh in darkness;" and, as far as regards a perfect knowledge of it, it is so now, and probably ever will remain so. Nevertheless, like as a physical object, though involved in mystery to one of our senses, may be somewhat illustrated by the aid of another, whereby a better conception of its form, dimensions, or other properties, may be acquired, so, in reference to some of the more subtle and active agents in nature, which are not cognizant to all our senses, (as heat, light, electricity, &c.,) we are enabled to acquire considerable knowledge of their source and nature, as also of the laws which govern them, by connecting one fact with another, till the mind, by reasoning, becomes satisfied that the inferences drawn are correct.

Let us apply this principle of induction to a brief enquiry into the cause of Cholera. We see a disease originating in India, and, after causing an awful destruction of human life in the East, advancing in a north-westerly direction; it bears its way onward through different climates, in all seasons, in all states of the atmosphere, in opposition to the winds, by land and by water, no condition of the surface of the earth, or state of its productions, accounting for the cause of it; nor can all the means of precaution which fear induces men to contrive, (such as quarantines, cordons, &c.,) arrest its progress; and though it appeared irregular in its movements, such was its irresistible march westward, that I perfectly remember a physician predicting, long before its arrival in England, that if it did reach here, it would break out on our north-eastern coast; and it is well known that Sunderland was the first place in which it made its appearance in England.

Now in endeavouring to investigate the cause of the rise and spread of the Cholera, in order to prove that my opinion of its origin is the most probable, I must shew that the other causes which have been assigned are groundless, not being supported by facts and reason. Some have supposed the cause to arise from a certain condition of the surface of the soil or its productions, some to atmospheric influences, and others to contagion.

From the Cholera having arisen in India under circumstances which generate paludal poisons, it seemed at first to give sanction to the opinion, that the cause was some peculiar condition of the surface of the soil or its productions; but facts attending the history of Cholera invalidate this hypothesis, for it has spread and raged in all countries, in all seasons, in the intense heat of India, and even in the cold of Russia (when the thermometer was 35 degrees below zero), in all conditions of the soil and state of its productions, and under circumstances the most opposite to those which favour the production of paludal poison. Similar conditions of the surface of the soil have existed for thousands of years, yet they have never been known to generate a disease like the epidemic Cholera. One fact is certain, that there must be some other agent at work, since no possible condition of the surface of the earth can account for the spread of Cholera in an island like ours; I conclude, therefore, that it must have had some other mode of conveyance than the surface of the earth.——I am far from denying that low, damp, unhealthy situations may not greatly predispose those residing in them to an attack of Cholera ; nay I will go further, for I think it probable, for reasons I shall shortly adduce, that in such situations something similar to the specific agent may be generated, which, adding to the activity of the latter, may cause those unfavourably circumstanced to be seized with the epidemic, who under more favourable conditions might have escaped. I think it universally acknowledged that there may be all the predisposing causes of Cholera, as bad health, low diet, filthy habits, or residence in a low damp situation ; yet without sufficient force in the existing cause, Cholera will not exist, any more than all the ingredients of gunpowder properly mixed will explode, without the exciting touch of heat.

Those who assign the origin of epidemic Cholera to some change in the atmosphere, equally fail in giving any satisfactory reasons to support this opinion. The great causes of contamination in the air, are, the heat of the sun acting upon certain states of the earth, and its productions, and exciting by the conjoined influence of the constituents of the atmosphere chemical actions, by which noxious agents are generated : but epidemic Cholera has raged in all states of the soil, and in all climates, where the causes of contamination are the weakest and the strongest, during the intense heats of India and the rigorous frosts of Russia. I am not asserting that no noxious agent exists in the air, where the epidemic Cholera is prevalent ; it may be in it, but not of it. If a man were killed by the emission of any noxious agent from the earth, it must be in the air before it kills him, but no one would say that the cause of his death was the state of the air. All reason and facts attending the history of epidemic Cholera, are against the supposition, that its cause is the altered state of the air. When we consider the mobile nature of the atmosphere, the tendency it has to diffuse itself, and the effect of currents of wind, we shall find it impossible to account for the Cholera attacking a limited district, town, or village, while the immediate adjoining ones shall be exempt; but especially that it should rage in one side of a street, while the inhabitants of the opposite escape. The history of the diffusion of Cholera is directly opposed to the supposition, that its cause is some alteration in the atmosphere, for it advanced in direct opposition to the winds; and if the cause had been in that element, we should not expect it would have been so slow in its progress.

The opinion, that the cause of Cholera is some *virus* generated in the human body, and propagating itself by intercourse from one individual to another, should seem to possess the most plausible grounds for its support. But in opposing this supposition, I do not require the advocate for contagion to explain how this virus could first originate, for I can conceive it possible that some unknown causes may spontaneously generate a poison in the human body which afterwards may propagate itself by contagion, as is believed to be the case in canine madness, which produces the disease called Hydrophobia; but to me the facts attending the history of Cholera appear perfectly inexplicable by all the known laws of contagion.

Many instances of the outbreak of Cholera similar to that which I am about to quote, might be given, but a single one may suffice; for if this can be explained on any known principle of contagion, the solution will apply to all. I take it from the last number of the British and Foreign Medical Review; it is quoted from Mr. Thom's report on Cholera, who is a medical officer in India. His regiment was cantoned about a mile from Kurruchee, where the Cholera broke out; he says, "that it was apparent there was nothing contagious in the nature of the disease; for instead of a few cases appearing first, and then the disease gradually spreading, it burst forth in a few hours in every European regiment, whether in camp or barracks, in every tent, and in every house; and it was at its acme in forty-eight hours after; when, instead of spreading further, it gradually and steadily declined. Now it appears that, for some days, or even weeks, a few cases had appeared in the native town of Kurruchee; but there also at the same period the malady became *suddenly* general in the whole place." This and similar facts are very important in assisting us to form our opinion, whether contagion is the cause of Cholera. A contagionist might object to the instance here given, and say, Give me an instance of such an outbreak, where no cases of Cholera existed in the neighbourhood previously, and where it is certain that no one has had any communication with the infected. This objection is about as much against as for the argument, for the spread of Cholera has been like that of other epidemics (the Influenza, for instance), and the mode of its diffusion scarcely admits of such evidence as he requires.

The conditions which the contagionist demands, are somewhat like those of a man who believes that agues arise from contagion; and who requires, to convince him that they are not infectious, a sudden seizure of a great number of persons, on a soil which could not generate Malaria, and where he was certain there had been no communication between them and any supposed infected district. As it would be needless to multiply examples of the manner of the outbreak of Cholera, I have deemed it necessary to meet the objections which might be brought against this and similar relations by the remarks I have just made. But perhaps a few more observations are required on Mr. Thom's account of so many being seized in a few hours. The contagionist is compelled to shew that all these sudden seizures with Cholera did, or might arise from infection, for he must remember that an epidemic disease may be infectious, but a disease the cause of which is contagion cannot create an epidemic influence; as Malaria may produce Agues, but Agues cannot produce Malaria. Though Dr. Copland appears to admit this principle, he still supposes that every case of Cholera arises from contagion. A man who can prove that Cholera is infectious, gives us an important fact, but this does not prove that contagion is the cause of Cholera. Dr. Copland, who believes in the infectious nature of Influenza, still thinks it a very subordinate cause of its propagation, compared with the epidemic influence on which it depends ; and this appears to be the case with Cholera. It seems to me incredible, that, on the outbreak of the Cholera which Mr. Thom relates, all the cases should be caused by contagion: to believe that such was the case, is to attribute such an awful power of infection to this disease as to induce a reasonable fear, that no flesh could be saved from an attack of it : if philosophers may speak of the "Magnetic Storm," surely we might here with equal force characterize such an epidemic as a "Choleric Storm." The sudden seizure of so many individuals with this disease, and the equally sudden subsidence of it, seems to render it impossible to suppose, that contagion is the cause of it.

Another argument to prove that the epidemic Cholera does not depend on contagion for its propagation, but arises from some peculiar cause, is, that though neither quarantines nor cordons seem to have arrested its progress towards certain parts, yet, where the epidemic cause of Cholera does not exist, it appears to me doubtful whether even an infected person is capable of causing it to prevail to any extent. It is stated, that, when the Cholera raged in Marseilles, ten thousand of its inhabitants fled to Lyons ; yet they did not carry the disease with them ; Lyons remained free : and in our own country, when the Cholera caused such great mortality at Bilston, and there was constant communication with that town and Birmingham, only eight miles distant, yet the inhabitants of the latter town, like Lyons, remained free. If the disease is so virulently infectious as to produce such numerous and sudden seizures, as in the outbreak related by Mr. Thom, we should expect that Birmingham and Lyons would not have been exempt, but that some of the terrific poison would have been conveyed to these towns, in the same way as experience proves that the morbid poison, causing Small Pox and Scarlet Fever, is carried by individuals in their clothes to distant places, though the parties themselves were free from these diseases.

Analogy, drawn from the history of Influenza, is another and to me a very strong argument against its cause and diffusion being attributable to contagion. Like the Influenza, the Cholera (as Dr. R. Williams observes) has commenced in the same parts of the earth, taken the same direction through Europe, arrived in England in almost the same identical spot, and then bifurcated—one stream of it taking a direction to the southern parts of Europe, the other crossing the Atlantic. Looking at the marked and peculiar courses of each Epidemic, we must argue, with Dr. Williams, that "it seems to follow, therefore, that the two poisons must be of the same class, since their manner of diffusion is governed by the same laws." I think I may say that it is almost universally admitted that contagion is not the cause of Influenza; for though an infected person may be able to communicate this disease to another, yet we must not infer from this that contagion is the cause of Influenza; for even Dr. Copland justly concludes, that infection is a very subordinate agent in causing its diffusion. We see how improbable it is, by reasons drawn from analogy, that a disease, the cause of which is infection, should take the same remarkable line on our earth, as one whose origin and spread must arise from some secret sources.

The last argument that I shall bring against the probability that contagion is the cause of Cholera, is the testimony of medical witnesses. Dr. Williams quotes the authority of Mr. Jamesson, who says, "that not only the general voice of the inhabitants at large in India (in the part of the earth where the disease has raged the most,) is uniform against the disease being contagious, or conveyed from person to person, but also that of two hundred and fifty officers comprising the medical staff in Bengal, all but one are non-contagionists." If further arguments of this nature were required, I might bring forward the depositions of the medical men who gave their evidence before the Sanitary Commissioners in London, who all, except one, were decided in their opinion that the Cholera did not spread by the communication of the healthy with the infected. Can we suppose that the medical men, whose position in society brought the facts under their view, and whose duty it was to form a correct judgment as far as their opportunities and abilities enabled them, should come to a conclusion so erroneous; I can easily suppose that a disease, arising from an epidemic cause, should gradually be diffused; and that contagion should, by men of ordinary powers of observation, be mistakenly thought the cause of it, especially when an epidemic disease possessed an infectious power to communicate itself from one individual to another, as many suppose is the case with Influenza: but if contagion be the cause of malignant Cholera, I have shewn that the whole of the cases must arise from that origin; and if such were the fact, we can scarcely conceive how the judgment of medical men should have been so egregiously hoodwinked. I should hope for humanity's sake, that medical practitioners, collectively, who are daily administering the most potent agents, and in the judicious use of which so often depend the health and even the lives of their fellow-men, are not so criminally negligent in observing, or so defective in discrimination, as to give such an erroneous opinion in answer to the question, whether contagion be the cause of Cholera. Provided that they have so erred, if it be not a matter to be taken up by Her Majesty's ministers, it vitally concerns Her Majesty's subjects.

Having reviewed the chief causes assigned for the rise and spread of Cholera, it may be necessary to make a few observations on one or two of the more fanciful theories brought forward by men of talent and ingenuity.

When men are afflicted with a serious disease, of the source of which they are ignorant, and when the cause of their suffering is not deducible from any of the physical agents which surround them, or the knowledge they have of the laws which may modify them, they are apt to have recourse to fancy, and assign some imaginary causes. It is a painful state of mind thus to stand in awful consternation, like the poor savage when he first sees death inflicted around him by the means of fire-arms; it was very natural that the ancient Greeks, when ignorant of the action of the agents which surround them, and the laws which govern them, should attribute diseases to the direct agency of the gods; but though superstition has now happily ceased, yet figments of the imagination still survive. Some ingenious men, when they cannot account for certain effects by any known laws, or see their bearings to explain such effects, instead of suspecting their want of a perfect knowledge of these laws, or their results, have recourse to the creation of some new cause; this is the case, I fear, with a talented physician, Dr. H. Holland, of London, arising from a persuasion that no state of the earth or atmosphere, nor any of the ordinary laws of contagion, can account for epidemic Cholera. This author's imagination supposes, that insects, so small that even the oxy-hydrogen microscope cannot enable us to see them, may be the cause of Cholera; and that these malignant and all but spiritual beings are going round the earth, seeking whom they may devour. No man with less talents and influence than Dr. Holland possesses, could, in explaining the spread of Cholera, have commanded the attention which this groundless theory has received from some respectable authors. Dr. Holland's ingenuity is careful that nothing tangible shall be easily fixed upon to demonstrate that the inferences he draws from his hypothesis must be unfounded. His imagination first creates his invisible agents, then assumes they are poisonous, and finally adapts their habits and course to account for the spread of Cholera.

The doctor supposes that he has analogy to induce him to think that his hypothesis may be true; now analogy, it must be confessed, is a noble guide to truth, where we have not the evidence of our senses to guide us; but the well-known truth, that the best of things, when abused, become the worst, is applicable to our reasoning from analogy; for it enables an ingenious man to dress what is false in the garb of truth, and so greatly to deceive. If a man is allowed, in reasoning from analogy, monstrously to exaggerate the application of a fact, and mould it to suit his purposes, he can give a coloring of truth to the most incredulous and ridiculous suppositions. The world has swarmed with follies which the ingenuity and the imagination of men on this principle have hatched. It is one thing to assert what may be, and quite another thing to give good reason why it probably is so. Many reasons might be given to shew that a certain planet is inhabited by monkeys, and no one can prove it is not; but before I concede my belief, I shall require some facts which appeal to my reason and common sense. Dr. Holland's hypothesis appears highly improbable, when we come to reflect upon it; for if we believe with him that malignant Cholera is a disease of modern origin, we must at the same time believe with him that there has been a new creation of animated beings; or that their *ova*, though remaining dormant, yet retained their vitality for an unknown length of time; now we know that the seeds of plants will retain their vitality for ages, but it is contrary to experience to suppose that the ova of insects are endued with the same power. We are called upon also to believe that this new creation of beings (so minute that they are beyond the reach of sense) are capable of maintaining their vital activity in all climates and seasons, in the hot regions of India as in the rigid frosts of Russia, possessing moreover a wonderful innate propensity to migrate in certain directions on the earth, in defiance of all opposition from the strongest currents of wind, without any known final cause for this instinct, and seizing for their prey the inhabitants of a limited district, even one side of a street in a town, or an individual in a single house, leaving others in immediate contact untouched. With all respect to Dr. Holland's talents, I cannot but consider his hypothesis as alike unsupported by facts, reason, or experience.

Another physician, not satisfied with Dr. Holland's theory, maintains one of a different kind, with similar principles of reasoning, but not with the same caution. This gentleman attempts to prove that Cholera owes its origin to plants of a fungous class. By way of strengthening his arguments, he states that *Bichloride of Mercury* and *Emetic Tartar* have been found useful in Cholera; and as they are anti-fungic agents, the probability is that Fungi are the causes of that disease. His theory appears to me far more harmless than his anti-cholera agents, and with this remark I must decline any further comment upon it.

With these observations on the principal assigned sources of the cause of epidemic Cholera, and presuming that the arguments advanced in support of each respectively, totally fail of proof, let us try, whether, by connecting one fact with another, we cannot arrive at least to a high probability of the real source of it, though it may be nevertheless a scourge "walking in darkness."

No one who will calmly reflect, can fail to see the intimate connection there is in the history of the epidemic Influenza and the epidemic Cholera. If any specific cause can be assigned, founded upon such facts and reasons as will satisfactorily account for the origin and spread of Influenza, without having recourse to one of telluric origin, then I will admit that my opinion respecting the source of Cholera may be an erroneous one; for though the spread of Influenza has not been exactly the same as that of the Cholera, yet there has been such a similarity in its course as to induce my belief, there must be some common source for the cause of each. A knowledge of all the circumstances which concur to produce these fearful agencies must for ever remain a mystery to us; and perhaps the exact nature of those which affect us may never be perfectly ascertained; we can only judge of their nature by comparing them with others, with which science has made us better acquainted. In the mighty and secret laboratory of the interior of the earth, who can pretend to say how many gases and active agents may be generated which are unknown to us; and all we can presume is, that if great chemical agents are at work, the same laws govern their action beneath as on the surface: and if this be the case, certain effects must be produced. Let us, then, take a short view of the objections raised by those who doubt that any active agents ever emanate from the earth, or deny that they are the probable cause of Cholera.

Dr. Holland thinks his hypothesis of insects is a probable cause of Cholera, and rejects that of its telluric origin as singularly inapplicable to the cause and circumstances of the disease. His principal objections to the supposition, that terrestrial influence is the source of the scourge, are, that this influence is vague, undefined, its source unknown within the earth, and its slow and irregular progress, even through adjacent localities, under conditions apparently the most inconsistent with this idea of its origin. Let us see whether Dr. Holland's objections have any foundation in reason. If he calls an agent vague and undefined because it cannot be recegnized by our senses, or because it eludes our knowledge by the most delicate chemical tests, and that for these reasons we must reject it as an agent producing disease, then we must deny that Malaria is the cause of intermittent fever. But Dr. Holland should remember that there are more things going on in the heavens above, and in the earth beneath, than our philosophy can give a perfect account of. If we feel the effects of any agent, however perfectly ignorant we may be of the nature of it, and however mysterious the manner of its production may be, we are not therefore to be considered as unphilosophical and fanciful in conceding the existence of it. Dr. Holland appears to object to the terrestrial influence of Cholera, because we are altogether ignorant of its source within the earth; will Dr. Holland deny the magnetic influence, because he cannot point out the known source within the earth? The other objection which Dr. Holland advances against the probability of the cause of Cholera arising from some action within the earth, namely, its slow and irregular progress, somewhat amuses me; for if his hypothesis of insects so minute as to defy the power of an oxy-hydrogen microscope to render them visible, be the true cause of Cholera, surely the wings of the wind might have enabled these aërial beings, if too weak of themselves, to traverse the whole of Europe in quicker time; or if not their bodies, at least they might have wafted their eggs. But it appears to me unreasonable to deny the probability of some slow process of action going on in the earth; for we must be guided in our opinion in this matter by the effects produced, in the same way as we are in regard to the existence of Malaria producing intermittent fevers; and if Dr. Holland does not possess the power of *clairvoyance,* it is very bold in him to deny that there are some slow actions going forward in the interior of the earth: we must not suppose that nature is never at work there, except by explosions. As to the irregular movements of the Cholera being an argument against its arising from any agent in the earth, it equally fails with the rest. If we knew to a certainty that all the causes of operation in the interior of the earth, must be perfectly regular in their effects on the surface, then the objection, according to our notions of regularity, would decide the question; but we see no regularity as to time in the eruption of volcanoes, nor as to place in the convulsions produced by earthquakes, or in the effects produced on the magnet.

Another objection brought forward by a different author, to prove that no state of the earth could be the cause of Cholera, is, that it has seized the crews of vessels on the high seas. Surely this objection proves too much, for if it proves anything at all; it only goes to show, that no state of the *surface* of the earth can be the cause of Cholera. I can conceive it very probable that an emanation arising from the earth, covered by a large and deep body of water in motion, may be diffused, weakened, or modified in its action; but it appears to me a very weak argument to conclude, that, because Cholera has seized persons on the sea, therefore it cannot arise from any action in the earth; it only proves, in my opinion, that the agent must be exceedingly subtile and penetrating; for every common sailor knows that there is a state of the earth, a something in it, which affects the needle through a large body of water. When these are the principal objections brought against the supposition that some state or action in the lower parts of the earth is the cause of epidemic Cholera, I think every unprejudiced mind is bound to listen to the reasons which assign a strong probability, that some active agent is generated in the earth, which may be the cause of epidemic Cholera. From *à priori* reasoning, it is highly probable that nature, in her operations below the surface of our globe, is capable of evolving some agent which might sensibly affect the state of organized beings. Let us reflect on the awful power which must have been at work in the deep parts of the earth, to throw up those stupendous mountains which abound in different quarters of the world; the same or a similar power we see has upheaved and fractured the thick and solid strata below our feet. For wise purposes the causes which have produced these effects have been restrained in their operation: but we have proof that these powers are not entirely suspended, as volcanoes and earthquakes too truly attest.

What do we at present know, with all the aid of modern science, of the interior of our earth? or of the state of the materials of which it is composed, even within a few miles of its surface? or of the changes or chemical actions which may be going on, on a scale of which we can form but a faint idea? There is great discrepancy in the opinions of the most able and scientific men on these points. Leslie conceived the interior of the earth to be a hollow sphere, filled with an imponderable fluid of enormously expansive power. Some are of opinion that our planet must have immense caverns, and that we tread upon a shell, the thickness of which bears a very small proportion to the diameter of its sphere: the muttering of subterraneous thunder which accompanies earthquakes seems to give countenance to such an opinion. Others tell us that we must take it for granted that our earth abounds with subterranean fires, and they refer to volcanic action as a proof of this opinion. The celebrated Humboldt thinks that the interior of our globe is an enormous molten mass of materials so near the surface, that to him it seemed highly probable that the action of the sun and moon, which causes the ebb and flow of the ocean, might be felt in these subterranean depths. He states that it cannot with accuracy be ascertained at what depth below the earth the materials of it are semi-liquid or fluid, from an ignorance of the substances of which the earth may be composed, or of the different capacity for heat, and conducting powers, of the super-imposed masses, and the chemical changes which solid and fluid matter may undergo from enormous pressure; but he calculates that even granite may be in a fluid state twenty-one geographical miles below the surface.

Such is the opinion formed by the greatest natural philosopher of our time; he may not be correct in his calculations, but we do know to a certainty that there is heat (the most potent of chemical agents) at work below the surface of our earth, as the existence of volcanoes sufficiently evidence; and we also know that this all-powerful agent is found not far from the surface, witness the boiling springs of Iceland, and the warm springs of our own country. It is well that we do not see what is going on in the great laboratory beneath us; or very probably we should be inclined to believe too much in terrestrial influences, at least more than would be conducive to our ease and comfort.

It would argue very great presumption and ignorance to pretend to know what sort of materials, or what peculiar action of them beneath the earth, might generate an agent to affect the inhabitants on its surface; we know, however, from undoubted facts, that changes going on below the surface of our earth, not only affect the atmosphere, but all animated beings. The hurricanes which oft-times have accompanied earthquakes, are a proof that subterraneous changes affect the air. At the time of the volcanic irruption which took place in the island of Sumbawa, in the year 1815, a dreadful hurricane occurred, which hurled both men and cattle into the air. Humboldt says, that the temperature of the place where the town of Quito, in South America, is situated, was permanently altered after the earthquake of 1797. That there must be, previous to an earthquake, some secret invisible agent transmitted to the surface of the earth capable of sensibly affecting animated beings, is clear, from the well-attested facts that reptiles, insects, birds, and quadrupeds will evince great trepidation before its first symptoms supervene. Men also, it is stated, will be affected before the beginning of an earthquake with sickness, giddiness, headache, and depression of spirits. Such facts as these do, in my humble opinion, go at least to establish a probability that some noxious agent may be emitted to cause the Cholera. We are not to conclude that those convulsions of nature which are attended with the greatest noise and commotion, generate the greatest quantity of a noxious agent, that may be destructive to life and health. If the inhabitants of a town were compelled to breathe but a very small quantity of sulphuretted hydrogen, silently generated, more danger to their lives would result, than if they were exposed to a most violent thunder-storm. And when we further consider that there may be the same power in the interior of the earth, as we know there is on its exterior, silently to generate an agent, (imperceptible to all our senses,) which is able to produce the disease called Ague; no one ought rationally to infer, because he hears no noise in the earth, and can neither see nor smell anything emitted from it, that therefore nothing below its surface can be the cause of Cholera.

Like the simple rustic in Virgil, I may perhaps be allowed to compare great things with small. Suppose that the inhabitants of a house were seized with some disease, which no known cause could satisfactorily account for, and it was discovered that in the cellar of this dwelling a chemist of great known powers had a laboratory, where he performed operations on a large scale, but who, like Dr. Wollaston, would allow no one to intrude within the limits of his domain;—if a person were to maintain that the disease could not arise from what this subterraneous chemist was doing, because no one could either see or smell anything, nor yet hear any noise, and the house was generally healthy; the tenant merely admitting that he had been visited with fevers occasionally, and many years ago there was a case or two something like the Black Death in the house: let me ask, Would a physician be considered credulous and fanciful if he were to say in answer, "I think it highly probable the chemist's operations may be the cause of this disease; you are not aware of what he is doing below; I know something of his powers; he is wonderful in combining his materials; Sir Humphry is nothing to him; he can produce a deadly agent like Malaria, which eludes the detection of all sense and science. You can only judge of it by its effects." I would repeat my question, Would such a physician be deemed extravagantly absurd in so judging? Let me be allowed another illustration, which bears more directly on my subject; suppose that some noxious agent from what I shall call the great laboratory of nature were silently emitted from the earth, defying all knowledge of its character, except by the effects it produces. It breaks out in a certain district or village, inflicting a serious disease amongst the inhabitants. The people would from fear or curiosity seek for some cause; and knowing that contagion, as in Small-Pox, Measles, or Scarlet Fever, was a powerful and common source of diseases spreading in communities, and being ignorant of the real one, would it be unnatural that they should attribute this disease to that cause, when they saw it attacking several members of their own family, and their neighbours, at the same time? Surely the same reasons which induced even medical men to consider intermittent fever an infectious disease, when that fever was far more prevalent in England than it is at present, and before it became a well-established fact that certain conditions of the soil produced something which is called Malaria, though they knew nothing at all of the nature of it, except by the effects it produced,—surely, I say, the same reasons might easily induce people to believe at first that this disease might be produced by contagion. And here I may venture to affirm, that many, who at first thought this new disease arose from contagion, are at length convinced that that cannot be the great cause of it, because it attacks so many in a few hours who have had no communication with each other; neither can it arise from any condition of the surface of the earth, like intermittent fever, for it spreads in a certain direction; they are sure, moreover, that no unhealthy state of either town or village can be adduced for its production, for these unhealthy places have existed for hundreds of years, yet never originated the disease; and as to the arguments advanced to prove that the cause exists in the air, these are contradicted by reason, for the disease advances in a certain direction in spite of the winds, which do not even carry it back to the places which the disease has left. But there is one fact which puzzles mankind, and excites their fears, in spite of what the Doctors say, "that contagion cannot be the cause of the disease;" and that is, that frequent instances do occur, if common sense must give the verdict, which have all the appearance of possessing infectious properties, yet it must be confessed that in those places where the instances of infection have occurred, it has generally been in the direction where the epidemic influence seemed disposed to spread, or in families residing in places where it already existed; and what Dr. Copland says of the infectious nature of Influenza appears to be applicable to this new epidemic,—" that though there may be instances of infection from communication with those attacked, yet infection appears a very subordinate cause to that upon which the epidemic principally depends."

I have merely given this illustration, on the supposition that if any action in the interior of the earth, of a slow progressive nature, were to give out a noxious agent exciting a disease, which was capable of communicating itself from one individual to another, but contagion nevertheless not being the principal means of its diffusion, the history of it would be attended with the same mystery regarding its origin, the same doubts and conflicting opinions respecting the cause of its diffusion, as those which have attended the history of Cholera. I am aware that such being the case is no demonstrative proof of its telluric origin, but it is worthy of remark that this can be said of no other assigned source or theory.

I think we have almost equal evidence, that some peculiar state of the interior of the earth may be the cause of Cholera, as that Malaria is the cause of Agues, by an agent produced on certain states of its surface. If we believe that there is nothing in the air or the surface of the earth, or any known laws of contagion, to account for the Cholera, it appears to me that we must come to the conclusion, that some state below its superficial strata must be the source from whence it arises. How can we explain the following fact on any other supposition? I am indebted for it to the Medical Review before-quoted; it was related to the reviewers by Mr. Bostock, of the Fusilier Guards:—"In 1842, Her Majesty's 9th Lancers, proceeded up the

Ganges in two divisions, *en route* to Cawnpore. The regiment had just arrived from England, and the men were in rude health. The left wing marched first, on the 22nd of September, —an unfavourable time for a voyage up the Ganges, on account of the rapid subsidence of the inundations, after the heavy rains of the monsoon. As they proceeded, a few cases of fever and dysentery occurred, and on the 25th of October they had the first case of Cholera. Admissions from Cholera soon became general, while the cases of fever disappeared. The Cholera was of the worst kind, with few spasms, and no great amount of vomiting and purging. It reached its height in about four days. It was at the same time frightfully prevalent in the villages on the banks of the Ganges. The mortality on board the squadron of boats was great, and the medical officers recommended the speediest possible transit through the infected districts. Accordingly every exertion was made to pass rapidly up the river; in about twelve days the disease began to decline in severity. This change was coincident with their arrival in a country not suffering from the Cholera in so great a degree. A few days later they emerged altogether from the affected district; and at the same time the Cholera completely left them; there was no evidence of contagion; the boats (thirty or forty in number) were equally attacked, and the sick were necessarily mixed up with the other patients on board the hospital boat, yet the disease did not spread to these latter or to the attendants."—"But the important point is, that, about a month after this, the right wing and head quarters left Calcutta, and proceeded the same way up the Ganges. The voyage was an exact counterpart of that of the other wing. *They were attacked by Cholera at the same point, pushed rapidly on, and lost it where the first division lost it.*" Many other instances might be given of the circumscribed localities where the Cholera has raged, but this appears as apt a one as I have read of. Let every one who reads this ask the question, From what other source could the cause of

Cholera arise than one below the superficial strata of the earth? The same sun has been shining upon a similar state of the soil as here existed for thousands of years, and never generated the malignant Cholera. Besides we have shown that it has raged in the most opposite conditions of the surface of the earth, or the states of matter upon it; therefore this is an improbable source to which to attribute it. The supposition that Cholera was in this instance produced by some contamination of the atmosphere, independent of its action on materials on the surface of the earth, or emanation from the interior, appears less probable still. The constituents of the atmosphere are few and simple; and, independent of some peculiar condition of the earth, it seems to me hardly possible that any self-generated, vitiated state of the air can be the cause of Cholera; reason and past experience bear testimony against such an opinion. Considering, moreover, the mobile nature of the air, the tendency it has to diffuse itself, and the effect of the winds, can we conceive it likely that it should have remained unmoved for a month? but such must have been the case if the atmosphere were the cause of Cholera; for, in the instance just given, the last division of the Lancers' voyage up the Ganges, taken a month after the first, was attacked by the Cholera at the same point, and lost it at the same point, as the first division. Now unless we are to presume an almost total absence of judgment in the medical men as a body, I think we must conclude that contagion cannot be the cause of Cholera in this and other like cases.

In bringing my remarks to a close on this division of my subject, I may just give a summary of their purport. We have seen a disease which no state of things exterior to the earth, or any known laws of contagion, can account for. If, under such circumstances, the Cholera had moved within two straight, well-defined lines, had pursued its course through all seasons and climates round the globe, every one being convinced that no state of the surface of the earth or condition of the atmosphere or contagion was the cause of it, (the disease, be it observed, never prevailing without those limits,) and had devastated the inhabitants which were included within those limits, could any person under such circumstances doubt its telluric origin, or require that such a visitation should be repeated in order to convince him that the earth was its source ? If the disease appeared again, by spreading itself over the earth in no particular course, he would conclude that the cause, whatever it was, had been diffused; but still he would believe that it proceeded from the same source. Now though the Cholera has not marched within any very clearly-defined boundaries, we have had a repetition of the same morbid influence (producing both Influenza and Cholera) progressing along certain quarters of the earth, and baffling all our efforts to explain it, except it be referred to some cause *below* the superficial strata of our globe. What is wanting in regularity to convince us of the cause appears to be made up in the repetition of its course. It is very possible that neither the Cholera nor Influenza may take the same remarkable direction again; but looking at the reasons which I have given for attributing the cause to some peculiar action beneath the surface of our globe, that irregularity would not invalidate the conclusion I have drawn. We know that the causes which produce earthquakes or volcanic eruptions, or those which influence the magnet, are not regular in their action. If there are *magnetic* storms, why should there not be *Choleric* storms? To be able to account for the irregularity of earthquakes, volcanoes, or the motions of the magnet, science must pierce to the depths below, and be able to watch the mighty operations there going on. This, however, is beyond its reach; but amongst other conjectures, if we suppose there is, as Humboldt suggests, a molten mass of nearly eight thousand miles in diameter, within twenty-one miles below our feet, (put in motion, it may be, by the influence of the sun and moon,) we may then suppose an agent generated by some action of those perhaps perfectly-unknown materials, that may account for the dreadful malady which is the subject of my paper; and the varying nature of the strata of which the earth is composed may conduct it in an irregular form and manner to its surface.

If it be objected that any action from beneath our feet should be the cause of Cholera, because such an agent has not heretofore been known to produce this disease, let me be permitted to say, that I cannot but deem this reasoning very inconclusive; because, except Providence dispenses with secondary causes in inflicting this and other maladies, there must be in Cholera, as there unquestionably was in Black Death, some different states of matter, or some new combination of it, either exterior to or within our globe; and since the knowledge of man, after long and severe investigation, can assign no cause for the Cholera exterior to our earth, and having reason to believe that there are very powerful agents at work beneath us, it appears to me perfectly reasonable to infer, that epidemic Cholera, like other true epidemics, arises from "some secret and inexplicable alteration in the bowels of the earth."

I must now advert to the nature of that agent, which the preceding pages, I believe, will lead us to suppose is emitted from the earth. I shall avoid all refined reasoning upon a subject of which we can know nothing, except by comparing its effects with another agent with which we are better acquainted. We must remember that all chemical actions are attended with the evolution of electricity; and that this is developed in a degree proportioned to their amount; now we have facts to justify the belief, that heat, which is one of the most powerful chemical agents, exists to an almost inconceivable degree in the interior of our earth. It would be unreasonable to conclude that the powers of this agent are there dormant, as regards the production of any important changes. It is only of late years that magnetism and electricity have been proved to be identical; I think it will not, therefore, be considered unphilosophical to suppose that some agent analogous to electricity may be developed by those actions in the interior of the earth, which may differ from the latter-named agent in some of its modes, as magnetism does from electricity. It is acknowledged, I believe, by the most competent judges, that nothing is positively known of the true nature of electricity; "whether it is a mere property of matter, like attraction or cohesion, a mere force acting independently of all interposed material; or whether, like light, it consists in the undulations of an etherial medium, filling space,—cannot be determined."* I think it necessary to make these remarks, because, if the agent which causes the Cholera in all its modes of action, cannot be explained in perfect accordance with what is at present known of electricity, it does not thence necessarily follow that it is neither electricity nor an agent analogous to it.

No one will pretend to deny that an agent possessing electrical properties may be emitted from the interior of the earth to its surface; for we know, from the boiling springs of Iceland, that heat is conducted to the surface of the earth, and that magnetism (identical with electricity) is always in action from some cause in the interior. The reasons which led me to imagine it highly probable, that electricity, or some agent analogous to it, is the cause of Cholera, are founded upon the following (to me) very remarkable coincidences between the effects of electricity and the Choleric agent. The deleterious effects of electricity on the animal fluids is an important fact in relation to the Cholera; but as every housekeeper knows that milk, with other fluids, will turn sour from the effects of a thunder-storm, no further proof will be required of so evident a fact. That it has the same deleterious effects on the animal solids is proved from this experiment:—"M. Achard cut a piece of beef into three parts: one of these parts was electrified positively for ten hours without a shock; a second was electrified negatively for a similar time; and the third not electrified at all. The three pieces were left in the same apartment, exposed to the same degree of heat. When examined the next day, both the pieces which had been electrified appeared to be tender, but were free from the least bad smell. On the fourth day the electrified flesh had an intolerably fœtid smell, and that which had not been electrified began to smell a little." It appears to me that the state of the body and the symptoms of one suffering from the Choleric poison, are the same as what we might expect from one suffering from electricity or an agent analogous to it.

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* See Kane's Chemistry.

In a case of Cholera we see an awful prostration of the vital powers, accompanied with vomiting and purging and an intense thirst; as if the fluids of the body were poisoned, and nature by her conservative powers was throwing off the poison, as far as was compatible with life; the patient loudly demanding water to replace the poisoned portions which had been ejected. I shall, however, have to make further observations on this subject when I come to the principles of the treatment of Cholera. It may be said, if electricity produces these poisonous effects, why should so many entirely escape the deleterious influence of it? The same objection might be raised against every other assigned cause of Cholera; and the answer in this case is the same which is given to explain the exemption of persons from other supposed sources of this disease, that there must be a peculiar state of the body to make them susceptible of its influence.

The second reason which leads me to suppose that an agent analogous to electricity may produce Cholera, is the time that persons are the most liable to attacks of Cholera. According to the experiments of Messrs. Pfatt and Ahrens on the electric states of the human body, they found that an increased accumulation takes place in the evening. I need not remind my reader how much more common attacks of Cholera occur in the night than in the day-time.

The third reason, in support of this opinion, is, that the habits which make people more susceptible of this disease, are those which cause an accumulation of electricity. The gentlemen just named found in their researches, that spirituous drinks augmented the intensity of electricity in the human body. I need only remark on this fact, that it is well-known that drunkards and intemperate men, *cæteris paribus,* were very liable to attacks of Cholera.

The last argument bearing on the electrical state of the human body, which I shall adduce to show that the Choleric agent is most probably of an electrical nature, is, that the state of the system which renders a man more liable to its attack is one in which the body is in a negative state of electricity; for when we consider that both forms of electricity produce exactly the same physical effects, this is another remarkable fact to support my opinion. Hemmer of Mannheim found, after numerous experiments on the electrical states of the human body, that it is negative when the muscular vigour is diminished. Experience has proved that men in this negative state of their system are much more susceptible of the Choleric poison. The British soldiers in India are generally in the prime of life and in good health, yet it it stated that with them even "marching heightens immensely the predisposition to Cholera."

It should be observed that none of these facts regarding the electrical state of the human body were given by the authors quoted to support any theory of the cause of Cholera. But another argument, drawn from a different source, seems to add weight to the supposition that electricity is the cause of Cholera. It was remarked in the history of Cholera, that this disease was more prevalent on an average amongst the inhabitants living in sea-ports, and by large bodies of water. When we consider that these are the places where electricity is more liberally given off to the atmosphere, it is not unreasonsble to suppose that increased activity may be given to the Choleric agent, and to cause that malady to spread more widely in those situations. M. Pouillet, in his experiments on atmospheric electricity, found, "that when solutions either saline or acid were employed, evaporation issuing from the body left it electrified negatively. Of the numerous saline solutions which were essayed, that of muriate of soda was naturally the one which excited the greatest interest; but it formed no exception to the rule. Hence it can hardly be doubted that evaporation from the surface of the sea forms one of the most important sources of atmospheric electricity. Even lakes and rivers must have their influence, since their waters are never perfectly pure." People living in low damp situations, especially where the soil has been flooded, or where there is a quantity of filthy matter undergoing decomposition, must be exposed to the same additional danger from Cholera as the inhabitants residing in sea-ports or by lakes and large rivers. Where the soil is saturated with moisture, there must be an evolution of electricity from the saline matter in the soil during evaporation; and if there is accumulated filth, chemical action will take place, which is always accompanied with the evolution of elecricity. When we consider that the people who live in the situations here named are often suffering from all the evils of poverty to debilitate their powers, and render them more susceptible of a morbid agent, we need not wonder that these combined circumstances should add a frightful activity to the Choleric agent, wherever it exists.

There are other circumstances which may cause the Choleric poison, presuming it to be of an electrical nature, to act with greater force in some localities than others, as when the strata of the earth favour its emission by the materials of which they are composed.

Let me briefly recapitulate the remarkable coincidence of character existing between the Choleric agent and electricity; they produce the same deleterious effects on animal fluid and organization; the time in which men are most influenced by these agents are the same; those whose habits augment the intensity of electricity, we have seen increase the liability to Cholera; we have seen also, that the state of the system which causes men to be in a positive state of electricity renders them more susceptible of the disease. I have, moreover, attempted to explain why men who live by a large body of water, or where the soil is saturated with moisture, are more liable to its attacks. We have seen that evaporation from saline solutions serves to supply the atmosphere with electricity; and though a certain portion of it may be highly salutary, yet when increased beyond a certain amount may become a noxious agent; just in the same way as the air we breathe, though composed of similar constituents to nitric acid, is essential to life, yet the latter, from being a chemical combination in different proportions, becomes an active poison.

If I have proved that it is highly probable that the cause of Cholera is of an electrical nature, I think we must conclude that it is emitted from the interior of our globe; for no ordinary causes in operation exterior to it can account for its production; for did it arise from the atmosphere, independent of this source, we could not probably explain its very partial influence in different localities. It seems to me, therefore, in accordance with reason, experience, and facts, to infer that the cause is what I have just stated.

I now come to the second division of my tract, in which I was to give my reason for considering malignant Cholera as infectious, that is, that one individual suffering from it, is capable of communicating it to another. I believe that the following principles, laid down by Sydenham, are applicable to all genuine epidemics of a malignant nature. Sydenham says, "I conceive, then, that the malignity in epidemics, whatever its specific nature be, consists and centers in very hot and spirituous particles, that are more or less opposite to the nature of the circulating fluids, because such particles only are capable of producing so sudden an alteration of them as is frequently observed in malignant diseases. And I judge that these hot and spirituous particles act chiefly by way of assimilation; because, by the law of nature, every active principle endeavours to produce its like, and to produce and mould whatever opposes it to its own nature. Thus fire generates fire, and a person seized with a malignant disease infects another by an emission of spirits, which soon assimilate the juices to themselves, and change them into their own nature." The opinions expressed in this passage embody important principles; they are similar to those adopted by Liebig; and will I think stand the test of reason and experience, as regards their application to malignant Cholera. We have reason to believe, that in Cholera the fluids of the body are poisoned; and we know that experiments have proved that putrid matter introduced into the system will produce all the symptoms of a malignant fever; and there is a probability, independent of experience from this fact, that a disease of a malignant nature like Cholera, may give out active poisonous particles into the air, which, like Small-Pox and Scarlet Fever, may cause one similar to itself. A disease may possess very different degrees of infectious or contagious powers, and these powers are not always in proportion to the dangerous nature of a disease; the exciting nature of Scarlet Fever is far more easily communicated to the human subject than that of Hydrophobia. It is said that not one man in fifteen bitten by a mad dog is afflicted with Hydrophobia; but if this proportion were diminished to one in fifty, even then most men would dread the idea of having the saliva of a mad dog in their veins. The circumstances attending the appearance of Cholera seem to me to be those which are very likely to deceive even medical men (and those, moreover, who have had frequent opportunities of observation), in forming their opinion of its contagious nature.

When a disease is prevalent, and there is proof that a great majority of the cases must arise from an epidemic influence, we are apt to imagine that the whole must have this source ; indeed the stronger that influence may be, the greater will be our difficulty of discrimination ; but it must never be forgotten that a disease, originating from epidemic influence, may nevertheless be contagious. It is no more a proof that any disease is not infectious because the great majority of healthy persons coming in contact with it escape, than that a mad-dog is not capable of causing Hydrophobia, because only one in fifteen which are bitten happen to imbibe the poison.

The weight of medical evidence, founded upon number, as to the non-contagious character of Cholera, cannot decide the question. It is well known that the great majority of medical practitioners in Paris deny that Typhus Fever is infectious; yet how many, I had almost said thousands of medical men in England, possessing intelligence and sound judgment, believe that Typhus Fever is infectious; and that their opinion is founded upon circumstances and facts which one would imagine ought to convince any one, whose organs of mental vision are not suffering in this matter from a chronic prejudice which no ray of truth can penetrate. Even in our own country, the great majority of medical men, until lately, disbelieved the infectious nature of Yellow Fever, but the facts attending the outbreak of it at Boa Vista, have changed the most sceptical into converts.

In reference to the infectious nature of Cholera, I have myself little or no doubt upon the point. I have perhaps been placed in circumstances more favourable for forming a better judgment of its contagious nature, than those who have observed the spread of it where the epidemic cause was stronger or more prevalent, when, from so many persons having been seized simultaneously, they have been liable to confound the cases which have really risen from contagion, with those which have originated from the other source.

The town of Barnsley, where I reside, was visited with the Cholera in 1832. It prevailed principally among the inhabitants in certain districts, where the labouring classes have their residence; and it may be well to mention, that many of the houses which were attacked by the Cholera, had been inundated by a flood a short time previous to its appearance. But what I would particularly force upon attention is, that in the north part of the town, which is dry and elevated, there was only one case of Cholera, except in three establishments, and in these the Cholera raged and caused great mortality. These three places were the Workhouse, the residence of a physician, and the house of a relative of his opposite to his own. In all these three residences communication with the infected can be distinctly traced. The first case which was seen in Barnsley was brought from a distance to the Workhouse; this fact I am certain of, for I well remember hastening to see a disease which I had read and heard so much of. In the Workhouse, containing at that time between forty and fifty inmates, six died of the Cholera. The physician just alluded to was that year the medical attendant on behalf of the town, and many of the paupers were affected with it; not only, however, did he himself afterwards take it, and die, but two or three of his establishment were also attacked with it, and recovered; a lady, however, a relation living in the opposite house, who had visited the physician when suffering under the Cholera, appears to have communicated the disease to three persons in her house, who died; and though she herself soon became a subject of the malady, she recovered. Now in these instances there must have been either some very concentrated local cause, or contagion must have produced them. It is possible that there may have been an emission of the Choleric agent, but reason and facts are all in favour of contagion being the cause of the mortality. It seems impossible not to assign the prevalence of Cholera in these three establishments to one of these causes, for what else could explain the facts? Many other similar cases might be mentioned to prove the infectious nature of Cholera, but perhaps these may suffice.

I have no doubt whatever, that in both Cholera and Influenza infected persons are able to communicate these diseases to others; and in such a serious and fatal disease as the Cholera, even if there should be a doubt of its infectious nature, we ought to give the doubt in favour of prudence and safety; and, except where a person's social duties demand such an exposure within its infectious range, we should avoid any unnecessary communication with the infected.

In accordance with the division proposed at the outset of my pamphlet, I have now to advert to what I conceive should be the principle of treatment under this dire malady. The Author of nature has placed man upon earth in circumstances which call forth the exercise of his physical and mental powers to supply himself with the necessaries of life, or to protect himself from the evils to which he is exposed. Disease is one of these evils, and Providence has endowed many of the productions of nature with certain properties, which, by acting on organized animated beings, will produce certain effects; so that man, when suffering from disease or pain, is enabled to say from experience and observation, with a tolerable degree of certainty in many instances, that if such an agent is given, certain actions will be induced by it in the human body, by which the disease will be removed or mitigated. These remedies have their limits, and can produce no salutary effects except in conjoint operation with the vital powers, with which the living body is endowed. Physicians as well as philosophers, when they attempt to fathom certain subjects, ought to know the measure of their line. Though man by his knowledge, grounded on reason and experience, is able by the use of certain medicines to cure some diseases, relieve many, and soothe the suffering of most, yet there are diseases arising from morbid poisons, for which, alas, he has yet to discover an antidote. They must have a certain course, and produce certain effects, in proportion to the quantity of poison imbibed and the state of the system. Some diseases of this class (as Scarlet Fever and Small-Pox) are so well defined in their course, that no medical practitioner is so ignorant as to pretend to cure them by any remedies. But there are other diseases, arising from morbid poison, which form exceptions to that order; and this circumstance has led some to fancy that they possess specifics which will neutralize their action, and eliminate them from the body. Typhus Fever is one of those diseases depending upon the quantity of poison imbibed, and the state of the system, to determine its duration and severity. The most intelligent and experienced physicians consider it a great delusion to suppose that we possess any specific for this disease, so as to neutralize the poisonous agent, or eliminate it from the system. They conclude, and I think justly, that it is nature's work to rid herself of the poison; and that the chief thing to be done is, to place the patient in circumstances in which nature will have fair play in exercising her conservative powers, by avoiding and removing every thing which will weaken or oppress her energies, and to watch her demands with a diligent and intelligent eye, studying what are called the *juvantia* and *lædentia* of the case. Dr. Fergusson, whose talents and acquirements placed him in a high situation in the medical department of the army, says, that a physician who thinks he possesses medicines of a specific power in fever, "should really have his own license suspended, and himself put under cure until the monomania subsides." Those who do not agree with this strong language will admit that medicines, though useful occasionally, are very subordinate means towards promoting the recovery of one suffering from Typhus Fever.

The preceding remarks have been elicited under a persuasion that some medical men seem to forget the character of the disease they have to treat, when called to a case of epidemic Cholera. What I have said respecting Typhus Fever is in a great measure applicable to the treatment of Cholera: it is a disease arising from a morbid poison, for which we possess no specific; and the removal of this poison must be left in the hands of those laws which the Creator has impressed on our organization. The duty of the medical attendant is to act as a handmaid to nature, attend to her calls, and to take care not to oppress her with officious help. No disease gives more evident symptoms that the system is suffering from some morbid poison than the Cholera does; and we have strong reasons to believe, that this poison principally affects the fluids of the body: the suddenness of the seizure, where no important disease of any organ can account for the symptoms, appears to confirm this view. Nature seems to make an effort to throw off the poisoned fluids, as far as is compatible with life, by the surface of the alimentary canal. It is acknowledged, that the worst cases of Cholera, and those which are the most suddenly fatal, are such as are attended with little or no vomiting and purging: and all that I have seen of Cholera tends to strengthen the fact: in those cases which came under my own eye, I saw an awful depression of the vital powers, severe vomiting and purging, as if nature was struggling to eject some poison from the system. In endeavouring to treat this disease, I must confess I felt myself in the dark; those who had seen the most of it, were very conflicting in their opinions as regards the best mode of treatment; I hope that I did my best to relieve them; and as medical men said "that the pathognomic symptoms of malignant Cholera was a suppression of the bile, and if you can get the liver to act, you will cure the disease," I gave small and repeated doses of calomel; but how this agent could act beneficially in so great a depression of the vital powers, and in such tempestuous disturbance in the alimentary canal, I was puzzled to conceive, and was very sceptical in the administration of it. The patients generally suffered from an intense thirst, and as I lay it down as a principle that we should never resist the instincts of nature in the practice of medicine, except we have some strong and plain reason to do so, I let them drink; for I secretly argued, 'Diluents soothe a painful sensation; they will give the stomach something to act upon; if there is any morbid matter in the stomach and bowels, they will dilute it, and they are the most likely to supply the blood, suffering from the drainage of its serous portion, with a thin bland fluid.' It was only subsequent to an accidental conversation with a lady, that I became impressed with the great importance of attending to the instinctive desire for cold water; she told me that a medical gentleman, who had the care of a Cholera-Hospital in the south of England, told her that he found nothing given internally of any service except cold water. The observation of this gentleman, added to what I had seen of this disease, led me to a train of reflection, which convinced me of the vital importance of diluents, especially cold water, in the treatment of Cholera; and that how careful we should be not to give anything which will interfere with their absorption. It is evident that in Cholera the blood must lose a great part of its serous element; and pathological facts shew, in examining the body after death, that the blood is "of an oily or ropy consistence, very closely resembling tar or treacle;" this being the case, it requires but a very superficial knowledge of anatomy to convince any one, that blood approaching to this state cannot possibly circulate through the fine capillary vessels of the system, and if it does not circulate through these, the blood cannot undergo its proper changes in the lungs; all secretions must be suspended, and death the result. Diluents may not save the patient in such a state of the blood, but die he must *without* them. No one can deny these inferences, if he allows himself to reflect, and he will see plainly that no drug, which the vegetable, animal, or mineral kingdom supplies, is able to restore the watery portion of the blood, so absolutely essential to life.

I cannot resist a few words to the objections which may be raised by those who deny the utility and necessity of the administration of cold water in Cholera. Some may think that the water will not be absorbed in such a disturbed state of the alimentary canal, when the serous parts of the blood are discharging themselves through the surfaces of the mucous membranes, and that the current from the blood to the internal surface of the intestines will oppose one from the stomach and bowels to the blood. Surely, however, such an objector is not acquainted with, or forgets the laws which govern the imbibition of fluids, both in living organized beings and dead animal matter. No one, I think, will deny, that secretions from the blood in the alimentary canal take place simultaneously with the absorption of alimentary matter in the living body; and a very simple experiment will prove that in dead animal matter a double current will take place between fluids separated by a membrane; for if a bladder full of water is put into a vessel of thick fluid, there will be an interchange between these two fluids; but the water will flow much more readily to the thick fluid, than the thick to the thin, for nothing is imbibed with such avidity as water by animal textures.

Nature is crying out for water in cases of Cholera, and doubtless not without necessity; and, though she may reject the absorption of other substances in such a disturded state of the system, yet, from the strong demand there is for this fluid, and its easy imbibition on physical principles, even independent of the vital powers, we have no reason to question its peculiar fitness. A man who thinks his medicines will be absorbed, when water demanded by nature will not, must conclude that the laws of absorption have been suspended in favour of his remedies.

Dr. Budd thinks, from the result of experiments in injecting large quantities of water into the veins, in which were dissolved half an ounce of muriate of soda and four scruples of sesqui-carbonate of soda, that the loss of the serous parts of the blood does not constitute the disease. The temporary effects are wonderful; and I think they shew the vital importance of diluents, for, "by the time three or four pints had been ejected, the pulse was good, the cramps had ceased, the body that could not be heated had become warm, and instead of a cold exudation from the surface, there was a general moisture; the voice, before hoarse and almost extinct, was now natural; the hollowness of the eyes, the sunken state of the features, the leaden hue of the face and body, had disappeared; the expression had become animated, the mind cheerful, the restlessness and uneasy feelings had vanished; the vertigo and noises in the ears, the sense of oppression at the præcordia, had given way to comfortable feelings; the thirst, however urgent before the operation, had ceased, and the secretion of the urine was restored, though by no means constantly so."* These surprisingly-cheering effects, however, soon disappeared, and the patients sank with the usual symptoms of Cholera: but I think that these experiments clearly show, that the symptoms arise from the want of the serous parts of the blood; and they prove also, that, when they are forced into the system by artificial means, no permanent benefit results from them; at the same time they ought to convince us of the vital importance of introducing diluents into the system, when nature demands them, and to avoid anything which will interfere wtih their absorption.

A little consideration will manifest the important difference there is in these two modes, and the different effects we may expect. We might anticipate that the good effects of forcing diluents into the system would be only temporary; for we have no reason to suppose that the blood which remains in the body is free from the Choleric poison, and we know that "a little leaven leavens the whole lump;" and how rapid it is in its operation is seen by the sudden seizure of Cholera patients: from the knowledge of this fact, we need not be surprised that the water forced into the blood-vessels would also be contaminated. But when nature calls for water, we may justly suppose that she will introduce it into the vessels in the quantity, manner, and state, which will be most salutary, by appropriating it to the state of the system. Let me give a simple illustration, substantiating the great difference. Suppose a person was sinking from inanition; for want of the formation of pure blood, and from the disordered state of his system, he had no appetite for food, whereby to generate this vital fluid; if some pure blood were injected into his vessels, we might perhaps see some surprising effects produced by it, as we have read of in cases where it has been introduced by this means into old and debilitated persons; still we should expect no permanent benefit: but if this same person, who was sinking from inanition, began to have an appetite, we should reasonably expect that the food would be digested, and blood would be formed; and every rational person would take great care to give nothing, and do nothing, to disturb his powers of digestion, so that the wants of his system might be supplied. Surely it is highly unphilosophical to conclude, that because fluids, forced into the system, are not permanently beneficial, therefore nature's method of introducing them cannot be so.

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* See Williams on Morbid Poisons.

We should always keep in mind, that, in theorizing in this and other diseases, however beautiful our theory may appear to ourselves, or however correct our reasoning may be up to a certain point, yet one important fact overlooked, (of which perhaps we must necessarily be ignorant,) breaks the whole chain of our argument, whether it is the 'tenth or ten thousandth' link, and renders it totally inapplicable to the case in question. On the other hand it is not less gratifying to be enabled to appeal to known facts, in order to prove that our reasoning, and the practical inferences we deduce from it, are in accordance with nature, since all ignorant and rude attempts to set her at defiance in the practice of medicine must end in disappointment, or be highly injurious in their effects. It is to be feared that some practitioners, from being overwise or knowing too much, have been the cause of much suffering and serious injury to patients under this malady. A celebrated politician once uttered a grateful ejaculation, that we had a House of Lords; and some I suspect, who have suffered from the Cholera, ought to be equally thankful for the conservative powers of nature, in having preserved them from the effects of injudicious treatment. "Vain man would be wise, though he is born like a wild ass's colt," for he goes headlong to work in the cure of his Cholera patients, and mistakes his rashness for decision of character.

One practitioner, with the intention of assisting nature, will give powerful purgatives in the commencement of the attack: Sydenham characterized such treatment in the English Cholera "as adding oil to fire;" and in malignant Cholera such officious interference is truly oppressing nature with our help in her fearful efforts to get rid of a morbid poison.—Another medical attendant, when nature is endeavouring to throw off the morbid poison from the body, gives powerful astringents; and if he could effect his purpose, he would kill his patient; but fortunately nature is in general sufficiently powerful to counteract such injurious attempts.

In the practice of medicine, the great and well-known aphorism of Lord Bacon is as applicable as in every other branch of philosophy; he says, that "Man, the servant and interpreter of nature, can only understand and act in proportion as he observes and contemplates the order of nature; more he can neither know nor do." In some diseases it is little we can learn of their real nature, and the duty of a medical man is often very simple. This may appear to be the case in the principle of treatment I am advocating in the Cholera; pathological facts and the instincts of nature seem clearly to indicate the treatment required in this disease; and when I see that what she demands, is best adapted to her wants, and I have demonstration that this demand is the most easily appropriated to the exigencies of her state, I cannot resist my convictions. Nature loudly calls for cold water; and we know that it is absorbed with greater avidity than any other liquid. From a superficial view of the state of a patient in Cholera, we might suppose that warm water would be better; but nature, rightly interpreted, never says one thing and wisdom another, and a little reflection will readily point out the preference to be given to cold. A large quantity is required to produce a certain degree of distention in the stomach and bowels, and this will promote the absorption of it, and we know that all that is taken cannot be absorbed. Large quantities, however, of warm water would create nansea, and so prevent a sufficient quantity from being taken. At the same time, where warm water would be more grateful to a patient, it should be given in preference, for we may conclude there is some cause, though unknown, which renders it desirable.

Sydenham ordered his patients suffering from severe cases of English Cholera, to drink a large quantity of warm chicken-broth, but so weak as scarcely to taste of the flesh. If this form of a diluent, or any one of a similar nature, were more agreeable to the patient, and seemed better adapted to his case, I think no medical man would object to substitute it for pure water cold or warm, though, in the majority of cases of epidemic Cholera, cold water will not only be more agreeable but also more beneficial. I may here add that Sydenham not only gave diluents freely by the mouth in Cholera, but also administered them equally freely by the intestines. He describes the Cholera as being so severe in his time as often to destroy the patient in twenty-four hours; yet he says he was always successful by this method of treatment, if he were called in at the commencement. He strongly condemned the administration of any form of purgatives or astringents in an early stage of this disease as highly injurious, the former as adding to the evil, the latter as fatal in their effects.*

We cannot expect that there will be the same demand and necessity for diluents in all cases of Cholera; in those where the patient is affected with such a large portion of the poison, that there are little or no efforts of nature to throw it off by vomiting and purging; or in those milder ones of this disease, where there has been no great drainage of the blood; we must be guided in these cases, as in others, in the administration of diluents both in quantity and kind, by the instincts of nature.

I am not unconscious that the simplicity of the means thus suggested as important in the treatment of Cholera, may subject it to neglect or even to contempt, though dictated alike by the instincts of nature and the pathological state of the system. There are persons in every class of society who are more captivated with the *opus operosum* of medicine, than with the use of simple means, though reason and experience both point out their better fitness to the case. The leper was commanded to wash in Jordan for the cure of his disease, and being wroth at the unpretending character of the remedy, he went away murmuring, "Behold I thought he would surely come out to me, and stand and call upon the name of the Lord his God, and strike his hand over the place, and recover the leper." Let these lovers of art remember, that the man who mangles the human body with the greatest boldness and confidence, is not the best surgeon, nor he who torments his patients with the severest remedies, always the most judicious physician.

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* It appears to me that the English and epidemic Cholera, though different diseases, are yet of the same species; there may be the same difference in those as there is between the common Yellow Fever and that of an epidemic character, yet when the symptoms and states of the system in any two diseases are similar, I think our principle of treatment ought to be similar, except we possess a specific for either of them. We may conjecture, from Sydenham's treatment of the English Cholera, what it would have been in the epidemic.

I cannot, in this my last reference to this author, refrain paying my tribute of admiration to one to whose writings I am so much indebted. I do not say that all was truth he wrote, or all was right he did, in the practice of medicine; he was a man, but the greatest of medical philosophers. He has been accused of theorizing himself, and condemning it in others; but a man possessed of a mind like his, could not but be conscious of its powers, and feel that it was his prerogative to speculate; and when we remember, that he lived in an age of darkness, as regards the knowledge of medicine, and those kindred sciences which now aid our medical studies, so that he was compelled to strike his own light, we shall pardon and admire his theorizing, and wonder at his great sagacity. Even in what may be considered the chaff of his writings, there are seeds of great truths, and reflection will convince us of their high practical importance.

The ignorance and quackery at present associated with the use of water as a therapeutical agent, is also calculated to bring it into disrepute, even when the use of it may be highly beneficial; but a man who refuses to drink water when he is thirsty, or a physician who refuses to use it as a remedial means, when he has good reason to conclude it will be of service, lest he should shew too much respect to hydropathists, are certainly acting irrationally. An hydropathist may be a fool, but a patient or his physician so acting certainly is. A certain recent writer, while he employs strong cathartics, and recommends diluents to supply the loss of the serous part of the blood, yet seems to think it beneath the dignity of the healing art even distinctly to name water; but why thus fastidious, if utility is the object of the practice of medicine? As long as there is a strong desire for water, reason tells us why it must be the best; for fluids composed of more complex constituents, when introduced into the blood in a diseased state, are far more liable to decomposition, and to excite morbid action, than the simple and bland composition of water.

It may be said by some, that patients suffering from Cholera *have* taken water; I am aware of this fact; and surely where the desire for it is so intense, it would be cruel to withhold it; and thousands I doubt not have recovered from the free use of it, whose cure has been attributed to some form of medicine; but I am afraid, that, in very many instances, from the helpless state of those suffering from this disease, this want has not been sufficiently attended to; and I have read from respectable authority, that diluents have been even forbidden to be taken in any quantity by the medical attendant.

Let any one read a medical treatise on Cholera, and he will see what little importance is attached to the administration of diluents; and even when their importance is acknowledged, he will see how often strong medicines accompany their use, which must necessarily interfere with their absorption: so superior a man as the late Dr. Williams seems to think they are only worth casually mentioning, for he says, the patient "often has a craving for cold water, and even iced drinks, and no inconvenience has resulted from them, even when he has freely drunk of them!!" So strong and clear is the call of nature under this malady, that one would think that any man of intelligence, suffering from Cholera, and having never seen a case of this sort, (where the serous parts of the blood had been drained by vomiting and purging, and the body had assumed a collapsed, shrunken appearance,) when he knew that his blood was in a thick state and could not circulate, while at the same time he was labouring under intense thirst, would insist on having water, and would have confidence in no man, who thought he possessed a medicine that would renew the watery portion of the blood without diluents; any sensible person, I should expect, would about as soon listen to a man who said he possessed the power to convert bread and wine into flesh and blood.

The great and judicious Hooker has observed, that the simplest truths "are first found out by discourse, and drawn from out of the very bowels of the earth;" and but for a due reflection on this observation, I should have considered it as wonderful that any one should question the vital importance of diluents, (in a state of the system where there is such a fearful drainage of the fluid parts of the blood, and the patient by the instinct of natnre is crying out for water,) to supply the loss of its watery portion, without a due quantity of which the circulation must be obstructed or cease, and death ensue.

It is not my object to enter into any detail of the treatment of epidemic Cholera, or to affirm that medicines are never of service in any states of this disease; and as regards external means, I think every one who has seen many cases will bear testimony that the application of heat is occasionally of great benefit. Friction, not only to relieve the spasms but to promote the circulation, appears likely to be of service. What I maintain is, that we have no specific for the Cholera, and our general principles of treatment for the various states and symptoms, in the later stages of this disease, must be similar to those which guide us in treating diseases caused by other morbid poisons. But I must add, that, in these stages of Cholera, when the vomiting and purging have entirely or in a great measure ceased, yet the general symptoms of the patient, accompanied by thirst, indicate a deficiency of the serous portion of the blood, to supply this deficiency must still form an important part of the treatment, and therefore food in a liquid form may be useful and necessary. Dr. H. Holland has written a sensible essay *"On points where a patient may judge for himself;"* and where a man's appetite has not been perverted by injurious indulgence in food and drinks, and he has a desire for any simple kind of food, we may conclude with this physician, that a patient on this point may judge for himself. The forcing of food, however simple, upon a patient, who has no appetite for it, is seldom of any service, and often injurious.

Many persons, especially of the poorer classes, are often desirous of wine, not because it is palatable to them in disease, or from any real benefit they experience, but because they think it is strengthening; still the patient should know, and the medical man remember, that it is often highly dangerous to stimulate weaknesss. There are states of the system, in which its powers are not only greatly depressed, but the natural sensibility of it is diminished or weakened, as we sometimes see in some cases of Typhus Fever; in these states stimulating drinks may be taken without producing their usual effects; but every one who has witnessed their influence upon debilitated persons, will readily concede, that the excitement produced by them is generally in proportion to the weakness of the patient. We know by experience, that depression follows undue excitement; it behoves us, therefore, to be cautious in administering such stimulants, and to watch their effects on the system.

It appears to me strange, not to use a stronger epithet, that a physician, whose writings and medical lore are calculated to give him great influence, should have recourse to emeties in the depressed state of one suffering from the Choleric poison, when, as he confesses, the vital energies of the frame are as profoundly prostrated as is consistent with life, so that nature wants the power to produce the effect intended. He also recommends in this fearful debility fifteen-grain doses of calomel and other purgatives given by the mouth and intestines; it is well that he should caution the nurses not to raise the patients too high in giving these medicines, as a neglect of this caution may cost them their lives. Even in the last stage of exhaustion and collapse he speaks of small general and local bleedings. Such treatment is opposed, as far as I can judge, to reason and common sense, and to these principles even a learned man should succumb in the treatment of his patients in Cholera. The state of the blood cannot require any further drainage of its serous portion by purgatives, while the weakness of a patient in such a condition can ill spare any loss of the vital fluid; the diluents which he recommends to be given "in hopes that some part of them may be absorbed," and supply the blood with its watery portion, are far more rational and safer remedies under such an awful depression of the vital powers than emeties, purgatives, and bleeding. If the poison which causes this disease were lying in the stomach and bowels, the treatment by emetics and purgatives might be judicious; but we must remember that it is in the blood, and that nature has drained it as far as is compatible with life. But I must repeat the sentiment—it is a painful reflection that men possessing medical knowledge and great zeal should verily think within themselves, that they ought, for the good of their patients, when life is hanging as it were on a slender thread, to use such violent and highly weakening agents.

It were almost superfluous to add, that I am not recommending water in modified states of this disease ; where, for instance, there is no great drainage of the fluids of the body, or any thirst to indicate that nature requires diluents. There are many cases of affections of the bowels, especially in old and debilitated persons, occurring at the time the Cholera is prevailing, and which I have little doubt arise from a portion of the same poison affecting the system, yet none but an ignorant hydropathist would force cold water upon them, from an idea that it was a specific ; so far from being serviceable, it might be highly injurious, and a very different kind of treatment might be required.

It will be obvious, then, that I have no specific to announce for the Cholera. Every man would consider it as the highest of all earthly honours to find out an infallible remedy for this fearful disease. If such a remedy exists, I must leave the triumph of its discovery to those who have more faith than I have, and whose mind is inspired with a more sanguine hope of success. But let him who is satisfied with nothing less than an infallible cure remember, that there is a right and wrong in the treatment of every serious disease, on which often depends the issue of life or death, though the means to be employed may not rest in the administration of medicine. Before the time of Sydenham, patients who were suffering from Small-Pox were submitted to a smothering heat, and forbad the benefit of cool refreshing air, physicians then thinking such treatment highly beneficial. After Sydenham exposed the absurdity and injury resulting from such a practice, it is thought (and I think justly) that the mortality from the Small-Pox considerably decreased ;

—at least one great benefit resulted from Sydenham's improved mode of treatment, and that was, the suffering of the afflicted was greatly diminished when nature and reason triumphed over pernicious art.

I by no means wish to hold out any false hopes by the principle of treatment I advocate in Cholera; I believe it most rational, and I also believe that patients suffering from this disease have the best chance of recovery under it; and what I have seen, or read of, or reflected on the nature of Cholera, has only tended to strengthen my view of the correctness of that treatment. I have endeavoured to support the opinions I advocate by appeals to known facts and the laws of nature. I have tried to avoid all sophistical reasoning, because it only bewilders and deludes the mind, and has been a great bane to the healing art. If any one can bring forward any satisfactory reasons to shew that my opinions regarding the theory and treatment of Cholera are erroneous, I shall still have the consolation to know, that nothing which an humble individual like myself can say is able to give support to error; for it is my sincere desire that every one should think and act, as truth, humanity, and conscience dictate.

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